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CLAIMS

[Claim(s)]

[Claim 1] Pumping plant transport the fluid in the aforementioned tube by moving along with the aforementioned wall while opposite arrangement is carried out at the tube formed by the elastic body which is characterized by providing the following, and which transports a fluid, the wall installed along with this tube, and this wall, it has the crash roller which the aforementioned tube is made to ***** by the aforementioned wall and this crash roller crashes the aforementioned tube. the cam which curves the press side for approaching to the aforementioned wall, pressing the aforementioned crash roller, and pressing the aforementioned tube to the aforementioned wall with this crash roller, and inside this press side, has the concave surface which is made to estrange the aforementioned crash roller from the aforementioned tube, and releases it from press, and is driven by the driving source -- a member the aforementioned crash roller -- the aforementioned cam -- the crash roller guide supported possible [movement] between the press side of a member, and a concave surface -- a member ****(ing) -- the above-mentioned cam -- a member or a crash roller guide -- to one member of the members While preparing the engagement section, when it has predetermined play in this engagement section and driving direction, the engagement salient which engages with this engagement section is prepared in the member of another side and the aforementioned engagement salient engages with it with the aforementioned engagement section, When the aforementioned press side presses the aforementioned crash roller, the aforementioned tube is pressed to the aforementioned wall with this crash roller and the aforementioned engagement salient has the aforementioned predetermined play in the aforementioned engagement section and a driving direction, while releasing the aforementioned tube from the aforementioned crash roller by the aforementioned concave surface -- the aforementioned cam -- friction damping which prevents that the aforementioned crash roller-guide member is interlocked with the aforementioned cam member until the aforementioned engagement salient and the aforementioned engagement section result in engagement by the drive of a member -- a member

[Claim 2] Pumping plant transport the fluid in the aforementioned tube by moving along with the aforementioned wall while opposite arrangement is carried out at the tube formed by the elastic body which is characterized by providing the following, and which transports a fluid, the wall installed along with this tube, and this wall, it has the crash roller which the aforementioned tube is made to ***** by the aforementioned wall and this crash roller crashes the aforementioned tube. the cam in which has the concave surface which curves the press side for approaching to the aforementioned wall, pressing the aforementioned crash roller, and pressing the aforementioned tube to the aforementioned wall with this crash roller, and inside this press side, is made to estrange the aforementioned crash roller from the aforementioned tube, and is released from press, and a rotation drive is carried out by the driving source -- a member the aforementioned crash roller -- the aforementioned cam -- the crash roller guide supported possible [movement] between the press side of a member, and a concave surface -- a member ****(ing) -- the above-mentioned cam -- a member or a crash roller guide -- one member of the members -- the engagement section

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the liquid fixed quantity feed tube pump used in each field, such as food, cosmetics, a drug, and chemistry. more specifically It rolls pressing and drawing through the elastic tube fastened between a fixed cylinder inside and two or more roller surfaces held near the periphery of body of revolution rotated by the inside of this cylinder to a cylinder inside one by one by this roller appearance. It is related with the pump mechanism in which the fluid (liquid including a gas, or the colloidal solution and the viscous body) which intervenes between the rollers of order is pushed and transported within a tube.

[0002]

[Description of the Prior Art] the body of revolution 102 to which the conventional tube pump 100 which shows basic structure to drawing 5 (a) holds a roller 101 -- a cam -- a member 103 and a guide -- the cam which consisted of a member 104 and was fixed to the axis of rotation 105 -- a member 103 rotates -- a guide -- the roller shaft 107 moves in the direction of a radial along the guide slot 106 established in the member 104 at the radial [0003] drawing 5 (b) when transporting a liquid -- anti-clock rotation (arrow CC) -- the roller shaft 107 -- a cam -- the inside of the guide slot 106 is moved to a periphery along the cam side 108 of a member 103, and a tube 109 is pushed against the cylinder inside 110 if body of revolution 102 furthermore rotates -- a cam -- edge 111a of the engagement slot 111 of a member 103 -- a guide -- the guide slot 106 which contacts the salient 112 of a member 104 and regulates the roller shaft 107 -- a guide -- a member 104 -- interlocking -- a cam -- it rotates united with a member 103 For this reason, the roller shaft 107 continues rotation to the counterclockwise rotation in a view with the position moved to the periphery, and it transports the liquid in a tube 109, compressing a tube 109 to the cylinder inside 110, and rolling inside.

[0004] When stopping equipment, by making body of revolution 102 rotate reversely after a rotation halt (clockwise rotation) Move the inside of the guide slot 106 in the direction which keeps away from a periphery along the cam side 108 of a member 103, return to the state which shows in drawing 5 (a), and a tube 109 is released from a pressure-welding state. the roller shaft 107 -- a cam -- While preventing degradation of a tube, the liquid was emitted by free fall by gravity, and generating of the denaturation and corrosion by stay is prevented.

[0005]

[Problem(s) to be Solved by the Invention] However, the position of the roller shaft 107 in the cam side 108 changes, and a pressure-welding state changes with the elasticity of a tube 109, and the irregularity of an inside continuously. Therefore, the stable support is not gained, but the roller 101 which is making the roller shaft 107 contact the cam side 108 formed in the slant face rotates, vibrating, and the roller 101 which is not in contact with a tube 109 generates a rotation noise in response to vibration. moreover, with the position where the roller 101 released the tube 109 from the pressure-welding state -- a guide -- a member 104 --

a cam -- it may not separate from a member 103, and it is united, and it may interlock and rotate and a roller 101 may not press a tube 109

[0006] when making it reverse, moving a roller 101 inside from a periphery position and releasing a tube 109 from a pressure-welding state, in order [furthermore,] to use gravity, the elasticity of a tube 109, and also friction with a tube 109 -- operation -- unstable -- a guide -- a member 104 -- a cam -- the purpose which is attached to the inversion of a member 103 and releases a roller 101 from a pressure-welding state the surroundings may be unable to be attained And inversion operation is the composition of operating body of revolution 102 with releasing a tube 109 from a pressure-welding state, and since it does not function as carrying out the pressure welding of the roller 101 to a tube 109, it cannot respond to the demand which transports a liquid to right reverse both directions.

[0007] Then, the purpose of this invention is setting up mechanically the pressure-welding position and non-pressure-welding position of the roller to a tube in the first place clearly. It is forming the cam side where a roller's is stably maintained [second] in the state of a pressure welding to a tube. It is preventing third the roller which does not receive regulation being in the suspension state of being easy to be influenced of vibration, and becoming the generation source of noise. the fourth hand of cut -- responding -- right -- reverse -- it is constituting the pumping plant which can transport a fluid in any direction

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the pumping plant concerning this invention The tube formed by the elastic body which transports a fluid, and the wall installed along with this tube, Opposite arrangement is carried out at this wall, and it has the crash roller which the aforementioned tube is made to ***** by the aforementioned wall. In the pumping plant which transports the fluid in the aforementioned tube when this crash roller moves along with the aforementioned wall, crashing the aforementioned tube Curve the press side for approaching to the aforementioned wall, pressing the aforementioned crash roller, and pressing the aforementioned tube to the aforementioned wall with this crash roller, and inside this press side, and it has the concave surface which is made to estrange the aforementioned crash roller from the aforementioned tube, and releases it from press. the cam member driven by the driving source, and the aforementioned crash roller -- the aforementioned cam -- with the crash roller-guide member supported possible [movement] between the press side of a member, and a concave surface ****(ing) -- the above-mentioned cam -- a member or a crash roller guide -- to one member of the members While preparing the engagement section, when it has predetermined play in this engagement section and driving direction, the engagement salient which engages with this engagement section is prepared in the member of another side and the aforementioned engagement salient engages with it with the aforementioned engagement section, When the aforementioned press side presses the aforementioned crash roller, the aforementioned tube is pressed to the aforementioned wall with this crash roller and the aforementioned engagement salient has the aforementioned predetermined play in the aforementioned engagement section and a driving direction, while releasing the aforementioned tube from the aforementioned crash roller by the aforementioned concave surface -- the aforementioned cam -- the friction-damping member which prevents that the aforementioned crash roller-guide member is interlocked with the aforementioned cam member was prepared until the aforementioned engagement salient and the aforementioned engagement section resulted in engagement by the drive of a member

[0009] Moreover, the tube formed by the elastic body which transports a fluid and the wall installed along with this tube, Opposite arrangement is carried out at this wall, and it has the crash roller which the aforementioned tube is made to ***** by the aforementioned wall. In the pumping plant which transports the fluid in the aforementioned tube when this crash roller moves along with the aforementioned wall, crashing the aforementioned tube Curve the press side for approaching to the aforementioned wall, pressing the aforementioned crash roller, and pressing the aforementioned tube to the aforementioned wall with this crash roller, and inside this press side, and it has the concave surface which is made to estrange the aforementioned crash roller from the aforementioned tube, and releases it from press. the cam member in which a rotation drive is carried out by the driving source, and the aforementioned crash roller -- the aforementioned cam -- with the crash roller-guide member supported possible [movement] between the press side of a member, and a concave surface ****(ing) -

- the above-mentioned cam -- a member or a crash roller guide -- to one member of the members While preparing the engagement section, when it has predetermined play in this engagement section and driving direction, the engagement salient which engages with this engagement section is prepared in the member of another side and the aforementioned engagement salient engages with it with the aforementioned engagement section, When the aforementioned press side presses the aforementioned crash roller, the aforementioned tube is pressed to the aforementioned wall with this crash roller and the aforementioned engagement salient has the aforementioned predetermined play in the aforementioned engagement section and a driving direction, While releasing the aforementioned tube from the aforementioned crash roller by the aforementioned concave surface The buffer member was constituted from an elastic member equivalent to the aforementioned tube as a complement wall which complements the space where the aforementioned crash roller does not counter the aforementioned tube, and it formed successively in the aforementioned tube, and the rolling contact surface of rolling element which the aforementioned crash roller goes around was formed so that elasticity might be shown over all peripheries.

[0010]

[Embodiments of the Invention] Below, the form of operation of the pumping plant concerning this invention is explained based on a drawing. Drawing 1 (a) is the plan of the pumping plant 10 of the first example, and the side elevation of a cross section with which drawing 1 (b) met the B-B line of (a), and (c) are expansion illustration of the portion enclosed with the circle of (b). There is body of revolution 16 rotated by the inside of the cylinder wall 14 of a case 12, the entrances 20a and 20b of a tube 18 are constituted in a case 12, a tube 18 is fastened between the peripheries of body of revolution 16, and the pumping plant 10 which transports the liquid in a tube 18 is formed by rotating body of revolution 16.

[0011] Body of revolution 16 is rotated centering on the fixed shaft 21 by which pinching fixation was carried out at boss 12a of the base of a case 12, and boss 13a of a top cover 13. the cam by which body of revolution 16 formed the gearing 22 in one -- the clockwise rotation (arrow C) indicated to be a member 24 by drawing 2 , and both counterclockwise (arrow CC) hands of cut -- play -- having -- a cam -- with the crash roller-guide member (it being written as a guide member below) 26 which engages with a member 24 A hand of cut is regulated by the long and slender guide slot 28 drilled in each correspondence position at the radial. a guide -- upper flange 26a of a member 26, and lower flange 26b -- ends -- the undersurface of a top cover 13, and a case -- it is fastened in slide contact with base 12b of the middle, and consists of a roller shaft 30 which goes the fixed shaft 21 around as a center, and three crash rollers (it is written as a roller below) 32 supported by the roller shaft 30 free [rotation] radial [of the roller shaft 30] -- a cam -- a member -- it is controlled in contact with press cam side 24a of 24 periphery, and with three rollers 32, one by one, between the cylinder insides 14, a tube 18 is rotated so that the liquid in a tube may be pressed out with

[0012] the gearing 22 which a motor 34 makes rotate the pinion 36 linked directly, and meshes -- rotating -- a cam -- a member 24 is rotated a cam -- press cam side 24a which demarcates the periphery configuration of a member 24 is formed in regular intervals along with the periphery at cam concave surface 24b with three smooth places When the roller shaft 30 faces in the center of cam concave surface 24b, a tube 18 is released from press of a roller 32. this release state to the gearing 22 -- a cam -- if a member 24 is rotated -- the roller shaft 30 -- a cam -- along with press cam side 24a which demarcates the periphery of a member 24, it moves in the direction of a periphery of body of revolution 16, and a tube 18 is pressed by the peripheral face of a roller 32 if a cam member furthermore rotates -- a cam member and a guide -- the play of a member is lost, a cam member and a guide member are united and begin rotation, and rotating, it moves so that a tube 18 may be drawn through among Entrances 20a and 20b, and as a roller presses out the liquid in a tube 18, it transports it

[0013] It is prepared outside so that a member 26 may be fastened. a cam -- a member 24 -- a guide -- to up cam board 25b of a motor 34 and an opposite side In accordance with the periphery surrounding the fixed shaft 21, the circular long hole 38 is drilled in three places. The engagement salient 40 which the correspondence position on the upper surface of upper flange 26a of a member 26 was made to set up sets up the suitable play 42 for a hoop direction, and it fits in loosely. a guide -- the penetrated engagement salient 40 projects more slightly than the upper surface of up cam board 25a -- making -- the braking washer 46 and a

guide -- it avoids that a member 26 ****s in the thrust direction the top cover 13 fixed to the case 12 in support of the end of the fixed shaft 21, and a guide -- between a member 26 and the braking washers 46 which rotate to one -- the wave type lock washer 48 -- installing inside -- a top cover 13 -- being stuck by pressure -- a guide -- a member 26 is energized in the thrust direction and a friction-damping member is constituted

[0014] the energization force of this thrust direction -- a guide -- the case which the lower edge of thin annular wall 26c which made the lower part extend ****s, and rotates from the rim of lower flange 26b of a member 26 -- it is supported by base 12b of the middle, and the friction-damping force is generated between the lower edge surfaces of annular wall 26c and base 12b which carry out a pressure welding namely, the guide to which braking was applied by the wave type lock washer 48 -- a member 26 -- a cam -- even if a member 24 starts rotation, it does not rotate, but the play 42 set up between the inner end faces as the engagement section of the circular long hole 38 which the engagement salient 40 penetrates is lost, and a idle state is maintained until the engagement salient 40 is pushed by the inner end face of the circular long hole 38 and starts linkage the guide which stopped at this time -- the cam which the roller shaft 30 which had movement of a hoop direction regulated by the member 26 into the guide slot 28 arranged at the radial faces, since cam concave surface 24b of a member 24 shifts to press cam side 24a of a periphery The roller shaft 30 follows along with press cam side 24a, and the roller 32 with which movement of a hoop direction was regulated for the roller shaft 30 in the guide slot 28 is linearly extruded by the periphery of body of revolution 16 (refer to drawing 2 (a)).

[0015] a guide -- a member 26 -- the end face as the engagement section of the circular long hole 38 -- the engagement salient 40 -- contacting -- for the first time -- a cam -- a member 24 is interlocked with and rotation is started by one At this time, already, the roller 32 is extruded by the periphery of body of revolution 16, it is supported stably, rotates in the position which the direction of a radial was regulated by press cam side 24a with a fixed outer diameter, and pressed the tube 18 to the cylinder wall 14 of a case 12, and presses out the liquid in a tube from the case entrances 20a and 20b. Pumping plant 10 operates a tube 18 as a pump by repeating operation in which body of revolution 16 is rotated and each roller 32 secedes from a tube 18 case entrance 20a and near the 20b, respectively.

[0016] the elastic material which is equivalent to a tube in the space of the cylinder wall of an opposite side where a tube 18 extends within a case 12 -- a buffer -- it inserts as a member 50, the rolling contact surface of rolling element which a roller 32 goes around is formed so that elasticity may be shown over all peripheries, the load concerning body of revolution 16 is mostly stabilized in homogeneity, and vibration and generating of a noise are prevented

[0017] The state where rotated reversely the motor 34 to drawing 2 (b), carried out anti-clock rotation (arrow CC) of the body of revolution 16, and the transfer direction of a liquid was made reverse is illustrated. this time -- a guide -- the cam which contacts the engagement salient 40 of a member 26 -- the inner end face of the circular long hole 38 of a member 24 turns into the time of rotation of an above-mentioned clockwise rotation (arrow C), and an inner end face of an opposite side Except that a direction becomes reverse, since other operation is the same as the time of rotation of the clockwise rotation mentioned above, it omits explanation.

[0018] the opposite direction after carrying out an end halt of the drive of a motor 34 as shown in drawing 2 (c), when suspending the operation of pumping plant 10 -- a cam -- predetermined angle rotation of the member 24 is carried out -- making -- a guide -- the engagement salient 40 of a member 26 -- a cam -- the play 42 suitable almost equally is formed among the ends of the circular long hole 38 of a member 24 -- you make it mostly located in the middle this time -- a guide -- since, as for the member 26, rotation is prevented by the braking operation of the wave type lock washer 48 -- the roller shaft 30 -- a cam -- attending cam concave surface 24b of a member 24, the roller 32 which counters a tube 18 loses support, by energization, turns the inside of the guide slot 28 to the center of body of revolution 16, and moves to elastic stability peculiar to a tube 18, and a roller 32 cancels press of a tube 18

[0019] That is, a tube 18 does not receive the damage on permanent deformation etc. by crash of a roller 32. Moreover, it is also canceled that the liquid which piled up in the tube 18 produces denaturation and corrosion. predetermined angle reverse rotation of the motor is carried out -- making -- the roller shaft 30 -- cam concave surface 24b -- almost -- a center,

i.e., a guide, -- the engagement salient 40 of a member 26 -- the circular long hole 38 -- in order to make it mostly located in the center, use of a step motor is suitable

[0020] Next, the assembly sequence of the pumping plant 10 concerning this invention is explained. a cam -- a member 24 is a cast by synthetic resin, and consists of a base and a lower cam board a base -- fitting of the fixed shaft 21 -- it is the member which formed in one drum section 25a which a hole 25 penetrates, and up cam board 25b which formed the circular long hole 38 Moreover, a lower cam board forms a gearing 22 in one, and consists of cam board 25c in which the appearance was of the same shape as up cam board 25b, and was formed in phase. first, a cam -- a member -- drum section 25a -- a guide -- a member 26 -- fitting in -- the circular long hole 38 -- a guide -- alignment of the engagement salient 40 of a member 26 is carried out, and it fits in loosely

[0021] Next, the position with which cam concave surface 24b laps is made to adjust up cam board 25b and lower cam board 25c, and it fixes to one by suitable coupling means, such as heat welding and adhesion. a guide -- while making the guide slot 28 in phase [in the position where the upper part and lower flanges 26a and 26b face] and drilled in it penetrate the roller shaft 30, inserting a roller 32 from a periphery between the upper part of a member 26, and lower flanges 26a and 26b, it inserts in the feed hole of a roller 32, and body of revolution 16 is constituted

[0022] The fixed shaft 21 is pressed fit in base boss 12a of a case 12, and it fixes to it. and the buffer equipped with the elastic function of the same grade as a tube 18 -- a member 50 is inserted the above-mentioned cam -- a member 24 and a guide -- fitting of the body of revolution 16 which combined the member 26 -- a hole 25 is extrapolated on the fixed shaft 21 The braking washer 46 is put so that central bore 46a may fit into central boss 25d of up cam board 25b (refer to drawing 1 (c)), and it makes the periphery of body of revolution 16 go around, and it inserts in entrance 20b of another side from one entrance 20a of a case 12, spending it so that compulsive stress or distortion with pars intermedia impossible for may not remain a tube 18. On the braking washer 46, a center is adjusted and the wave type lock washer 48 is laid.

[0023] Extrapolate a top cover 13 in case 12 upper-limit opening, and it is made to rotate in the predetermined direction, and fixes. Since the attachment-and-detachment tool is [the bayonet type connection mechanism] unnecessary, a combination for this can improve maintenance nature and is suitable. In a top cover 13 and a case 12, a tube 18 is pinched and it fixes. The opposite side of a top cover 13 is equipped with the motor 34 which linked directly the pinion 36 which gears with a gearing 22 with the output shaft, the cover 52 cast by synthetic resin is put on case 12 soffit opening, occlusion of the presser-foot-stitch-tongue 12c made to protrude on case 12 outer case is carried out to circumferential groove 52a cut in the cover 52, and it is firmly attached in it.

[0024] Next, operation of the pumping plant 10 concerning this invention is explained. if body of revolution 16 is rotated clockwise (the direction of arrow C) as a gearing 22 is driven by the motor 34 and it is shown in drawing 2 (a) -- a gearing 22 and the cam of one -- a member 24 rotates however, a guide -- a member 26 -- a cam -- since damping force is acting according to the energization force of the thrust direction by the friction-damping member containing the wave type lock washer 48 even if rotation is relatively [a member 24] possible, rotation is prevented namely, a guide -- a member 26 -- a cam -- it means rotating to an opposite direction relatively to a member 24

[0025] then, the roller 32 -- a guide -- it moves outward along the guide slot 28 of a member 26, and the roller shaft 30 is pushed by press cam side 24a, and a roller 32 carries out a pressure welding to the outside of a tube 18, and crashes a tube 18 between the cylinder walls 14 of a case 12 on the other hand -- a guide -- the guide which described above the engagement salient 40 of a member 26 -- the cam of a member 26 -- the play which moved by the relative inverse rotation to a member 24 in the inside of the circular long hole 38, and was set up between long hole edges is lost, and the long hole edge as the engagement section is contacted and after -- a guide -- a member 26 and a cam -- a member 24 is united and is rotated with a roller 32 clockwise (arrow C) And the liquid which is made to move a roller 32 clockwise and is between the crash portions in a tube 18 is transported to the hand of cut of body of revolution 16, and the liquid with which it was fed from entrance 20a is discharged from entrance 20b.

[0026] Drawing 2 (b) is illustration in the state where body of revolution 16 was rotated

counterclockwise (arrow CC). It is in the state where the roller shaft 30 is extruded by the slant face of drawing 2 (a) and opposite direction from cam concave surface 24b at press cam side 24a of a periphery, and the roller 32 was located in the maximum outside. a guide -- the engagement salient 40 which is in a idle state with a member 26 -- the inside of the circular long hole 38 -- setting -- the long hole edge as the engagement section of drawing 2 (a) and an opposite side -- contacting -- and after -- a guide -- a member 26 -- a cam -- it rotates counterclockwise (arrow CC) with a roller 32 to a member 24 and one that is, the roller shaft 30 pushes to press cam side 24a -- having -- a roller 32 -- a guide -- it moves outward along the guide slot 28 of a member 26, a pressure welding is carried out to the outside of a tube 18, and a tube 18 is crashed between the cylinder walls 14 of a case 12 And a roller 32 transports the liquid between the crash portions in a tube 18 to the hand of cut of body of revolution 16, and discharges the liquid with which it was fed from entrance 20b from entrance 20a.

[0027] And after suspending a gearing 22 as shown in drawing 2 (c) when suspending the operation of pumping plant 10, predetermined angle rotation is carried out at an opposite direction. a gearing 22 and the cam of one -- a member 24 rotates only a predetermined angle conversely however, a guide -- since the friction-damping member containing the wave type lock washer 48 is functioning, a member 26 is not rotated then, a cam -- by rotating a member 24 to the position which the roller shaft 30 faces cam concave surface 24b, the roller 32 which has countered the tube 18 is energized by the elastic stability of a tube 18, moves to the inner sense along the guide slot 28, and returns to the state where crash of a tube 18 was canceled At this time, the engagement salient 40 is located in the simultaneously middle of the circular long hole 38, and forms the play 42 of the same grade among the ends of the circular long hole 38. That it gets damaged since a tube 18 becomes free completely from a roller 32 does not receive degradation or permanent deformation by stress, either. moreover, a buffer -- the roller shaft 30 also releases the roller 32 which has countered the member 50 from a cam member -- having -- gravity and a buffer -- according to the elastic force of a member 50, it follows freely

[0028] Drawing 3 is a thing illustrating the second example of the pumping plant concerning this invention, the same sign shows the member which is common in the first example, and explanation is omitted. The side elevation having shown drawing 3 (a) in the cross section and drawing 3 (b) are the part plans which met the B-B line of (a). It changes to the friction-damping member in the first example energizing in the thrust direction, and the friction-damping member energized in the direction of a radial consists of pumping plant 10-2 of the second example. namely, instead of [of the braking washer 46] -- a guide -- braking which engages with the engagement salient 40-2 of a member 26 -- arc long hole 46b-2 which surrounded boss 47a to flange 47b which set up boss 47a in the center, and were prepared in it at equal intervals at the circumferencial direction are drilled by the member 47 like arc long hole 46b of the first example, and they engage with it with the engagement salient 40-2

[0029] The case 56 of the rectangle which installs the flat spring 54 for braking inside from the upper surface of a top cover 13-2 is set up. while boss 13a-2 which fit into the fixed shaft 21 towards a lower part from the center of a case 56 extend and functioning as boss 13a of the first example similarly -- braking -- it becomes the shaft supported free [rotation of a member 47] the both-sides side of boss 47a is turned to a center from both sides by the flat spring 54 of a couple, and the energization force is acted -- making -- a guide -- braking is applied to a member 26 An end is pinched by two pins 60 implanted in the point symmetry to the fixed shaft 21, respectively, and each flat spring 54 is regulated by the pin 62 which the free end implanted in the point symmetry similarly. Each flat spring 54 is set in a case 56 in the free state where a two-dot chain line shows. braking -- the diameter of the nose of cam of boss 47a of a member is reduced by the smooth curved surface, and it can do easily the work which fastens a flat spring 54 to a both-sides side, putting a top cover 13-2 from the upper part

[0030] fixation of a top cover 13-2 is performed like the first example, a center section extends and carries out elastic deformation of the flat spring 54 of the couple by which ends were regulated by pins 60 and 62 by compulsive intervention of braking boss 47a, and the energization force is acted on the side of braking boss 47a -- making -- between the fields of a flat spring 54 -- frictional force -- generating -- a guide -- a member 26 is braked Since the function by this braking operation is the same as that of the first example, explanation is omitted.

[0031] The same sign shows the member which drawing 4 is explanatory drawing of the third example of the pumping plant concerning this invention of operation, and is common in the first example, and explanation is omitted. In (b), (c) shows [(a)] the time of a halt at the time of anti-clock rotation (arrow CC) at the time of clock rotation (arrow C). the pumping plant 10-3 of the third example -- the cam of the first example -- the roller shaft 30 which moved to the outermost edge of the guide slot 28 by press cam side 24a of the cam concave surface 24b both sides of a member 24 -- being engaged -- a roller 32 -- the maximum outside position -- stable -- holding -- a cam -- the salient 64 of the couple as the engagement section which rotates a member 24 and one protrudes on press cam side 24a of each cam concave surface 24b both sides

[0032] As shown in drawing 4 (a) and (b), the salient 64 which carries out backward according to a hand of cut engages with the roller shaft 30. It can combine with the first example or the second example, in addition to the function of the engagement salient 40 in the first example or the second example, mechanical strength increases, and this mechanism can improve endurance. In addition, since it is the same as that of the above-mentioned example about an assembly sequence, operation, and a function, explanation is omitted.

[0033] As mentioned above, although the example was explained, this invention is not limited to the example of illustration, and is the range which does not deviate from the requirements for composition of this invention about the configuration, composition, etc., and it is expected that various change, reconstruction of parts, etc. can be changed about details. as for example, a friction-damping member -- a guide -- a member -- it is possible to use friction according to a magnetic suction force in to use the frictional resistance of the wing which rotates in a viscous oil instead of friction with an elastic spring **** [, and] [laying a mat with big frictional resistance to base 12b of the middle where the lower bottom edge of annular wall 26c ****s]

[0034] Moreover, you may carry out opening of the guide slot drilled in the radial to a guide member towards not a slot but the periphery closed like the above-mentioned example. Furthermore in the above-mentioned example, all of the cam member, each part article, i.e., the gearing, which constitutes body of revolution, of one, a guide member, two or more rollers, and a roller shaft can be decomposed scatteringly. However, it is also possible to avoid to come apart at the time of retubing, to combine a roller with a roller shaft by the snap ring etc., to combine a guide member and two or more roller shafts, and to constitute removable in the state of a sub-assembly. in addition, the circular long hole 38 and an engagement salient -- a cam -- a member 24 or a crash roller guide -- what is necessary is just to prepare in one member of the members 26, respectively

[0035]

[Effect of the Invention] according to [so that clearly / in the above explanation] invention according to claim 1 -- a cam -- since the friction-damping member which prevents that a crash roller-guide member is interlocked with a cam member was prepared until the engagement salient resulted in the engagement section and engagement by the drive of a member, the pressure-welding position and non-pressure-welding position to a tube of a crash roller are established mechanically, and a malfunction can be prevented Therefore, since the tube which an opposite direction is made to carry out predetermined angle rotation, and is made to rotate only a cam member conversely, moves to the inner sense and is crashing the roller is certainly released at the time of an operation halt once stopping body of revolution, except the time of an operation, it is lost that a roller crushes and damages a tube and the useful life longevity of a tube can be prolonged.

[0036] Moreover, according to invention according to claim 2, the complement walls which complement the space where a crash roller does not counter a tube are formed successively in a tube by the elastic member equivalent to a tube. Since the rolling contact surface of rolling element which a crash roller goes around was formed so that elasticity might be shown over all peripheries, while the load concerning a roller is stabilized by the elastic member replaced with a tube, the backlash of a roller shaft is pressed down, and rotation can be stabilized and can decrease a noise.

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the liquid fixed quantity feed tube pump used in each field, such as food, cosmetics, medical supplies, and chemistry, and is in a concrete target more. It rolls pressing and drawing through the elastic tube fastened between a fixed cylinder inside and two or more roller external surface held near the periphery of body of revolution rotated by the inside of this cylinder to a cylinder inside one by one by this roller appearance, and is related with the pump mechanism in which the fluid (liquid including a gas, or the colloidal solution and the viscous body) which intervenes between the rollers of order within a tube is pushed and transported.

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EFFECT OF THE INVENTION [Effect of the Invention] according to [so that clearly / in the above explanation] invention according to claim 1 -- a cam -- since the friction-damping member which prevents that a crash roller-guide member is interlocked with a cam member was prepared until the engagement salient resulted in the engagement section and engagement by the drive of a member, the pressure-welding position and non-pressure-welding position to a tube of a crash roller are established mechanically, and a malfunction can be prevented Therefore, since the tube which an opposite direction is made to carry out

predetermined angle rotation, and is made to rotate only a cam member conversely, moves to the inner sense and is crashing the roller is certainly released at the time of an operation halt once stopping body of revolution, except the time of an operation, it is lost that a roller crushes and damages a tube and the useful life longevity of a tube can be prolonged.

[0036] Moreover, the complement walls which complement with invention according to claim 2 the space where a crash roller does not counter a tube were formed successively in the tube by the elastic member equivalent to a tube, and the rolling contact surface of rolling element which a crash roller goes around was formed so that elasticity might be shown over all peripheries. Therefore, while the load concerning a roller is stabilized by the elastic member replaced with a tube, the backlash of a roller shaft is pressed down, and rotation can be stabilized and can decrease a noise.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] the body of revolution 102 to which the conventional tube pump 100 which shows basic structure to drawing 5 (a) holds a roller 101 -- a cam -- a member 103 and a guide -- the cam which consisted of a member 104 and was fixed to the axis of rotation 105 -- a member 103 rotates -- a guide -- the roller shaft 107 moves in the direction of a radial along the guide slot 106 established in the member 104 at the radial [0003] drawing 5 (b) when transporting a liquid -- anti-clock rotation (arrow CC) -- the roller shaft 107 -- a cam -- the inside of the guide slot 106 is moved to a periphery along the cam side 108 of a member 103, and a tube 109 is pushed against the cylinder inside 110 of body of revolution 102 furthermore rotates -- a cam -- edge 111a of the engagement slot 111 of a member 103 -- a guide -- the guide slot 106 which contacts the salient 112 of a member 104 and regulates the roller shaft 107 -- a guide -- a member 104 -- interlocking -- a cam -- it rotates united with a member 103 For this reason, the roller shaft 107 continues rotation to the counterclockwise rotation in a view with the position moved to the periphery, and it transports the liquid in a tube 109, compressing a tube 109 to the cylinder inside 110, and rolling inside.

[0004] When stopping equipment, by making body of revolution 102 rotate reversely after a rotation halt (clockwise rotation) Move the inside of the guide slot 106 in the direction which keeps away from a periphery along the cam side 108 of a member 103, return to the state which shows in drawing 5 (a), and a tube 109 is released from a pressure-welding state. the roller shaft 107 -- a cam -- While preventing degradation of a tube, the liquid was emitted by free fall by gravity, and generating of the denaturation and corrosion by stay is prevented.

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EFFECT OF THE INVENTION

[Effect of the Invention] according to [so that clearly / in the above explanation] invention according to claim 1 -- a cam -- since the friction-damping member which prevents that a crash roller-guide member is interlocked with a cam member was prepared until the engagement salient resulted in the engagement section and engagement by the drive of a member, the pressure-welding position and non-pressure-welding position to a tube of a crash roller are established mechanically, and a malfunction can be prevented. Therefore, since the tube which an opposite direction is made to carry out predetermined angle rotation, and is made to rotate only a cam member conversely, moves to the inner sense and is crashing the roller is certainly released at the time of an operation halt once stopping body of revolution, except the time of an operation, it is lost that a roller crushes and damages a tube and the useful life longevity of a tube can be prolonged.

[0036] Moreover, the complement walls which complement with invention according to claim 2 the space where a crash roller does not counter a tube were formed successively in the tube by the elastic member equivalent to a tube, and the rolling contact surface of rolling element which a crash roller goes around was formed so that elasticity might be shown over all peripheries. Therefore, while the load concerning a roller is stabilized by the elastic member replaced with a tube, the backlash of a roller shaft is pressed down, and rotation can be stabilized and can decrease a noise.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the position of the roller shaft 107 in the cam side 108 changes, and a pressure-welding state changes with the elasticity of a tube 109, and the irregularity of an inside continuously. Therefore, the stable support is not gained, but the roller 101 which is making the roller shaft 107 contact the cam side 108 formed in the slant face rotates, vibrating, and the roller 101 which is not in contact with a tube 109 generates a rotation noise in response to vibration. moreover, with the position where the roller 101 released the tube 109 from the pressure-welding state -- a guide -- a member 104 -- a cam -- it may not separate from a member 103, and it is united, and it may interlock and rotate and a roller 101 may not press a tube 109

[0006] when making it reverse, moving a roller 101 inside from a periphery position and releasing a tube 109 from a pressure-welding state, in order [furthermore,] to use gravity, the elasticity of a tube 109, and also friction with a tube 109 -- operation -- unstable -- a guide -- a member 104 -- a cam -- the purpose which is attached to the inversion of a member 103 and releases a roller 101 from a pressure-welding state the surroundings may be unable to be attained And inversion operation is the composition of operating body of revolution 102 with releasing a tube 109 from a pressure-welding state, and since it does not function as carrying out the pressure welding of the roller 101 to a tube 109, it cannot respond to the demand which transports a liquid to right reverse both directions.

[0007] Then, the purpose of this invention is setting up mechanically the pressure-welding position and non-pressure-welding position of the roller to a tube in the first place clearly. It is forming the cam side where a roller's is stably maintained [second] in the state of a pressure welding to a tube. It is preventing third the roller which does not receive regulation being in the suspension state of being easy to be influenced of vibration, and becoming the generation source of noise. the fourth hand of cut -- responding -- right -- reverse -- it is constituting the pumping plant which can transport a fluid in any direction

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DESCRIPTION OF DRAWINGS [Brief Description of the Drawings]

[Drawing 1] It is one example of the pumping plant concerning this invention, and the cross section with which (a) met the plan and (b) met the B-B line of (a), and (c) carry out expansion illustration of the portion enclosed with the circle of (b). Moreover, (d) is the expansion plan of a braking washer.

[Drawing 2] It is a partial diagrammatic view explaining operation of the example shown in drawing 1 , and (b) of (a) is a plan in which (c) shows the time of a halt, respectively at the time of counterclockwise rotation at the time of clockwise rotation.

[Drawing 3] It is the second example of the pumping plant concerning this invention, and the side elevation having shown (a) in the cross section and (b) are the plans which met the B-B line of (a).

[Drawing 4] It is a partial diagrammatic view explaining operation of the third example of the pumping plant concerning this invention, and (b) of (a) is a plan in which (c) shows the time of a halt, respectively at the time of counterclockwise rotation at the time of clockwise rotation.

[Drawing 5] In (a), with the typical plan showing the basic structure of one example of the conventional pumping plant, (b) shows the time of counterclockwise rotation at the time of a halt.

[Description of Notations]

10 Pumping Plant

12 Case

13 Top Cover

14 Cylinder Wall

16 Body of Revolution

18 Tube

20 Entrance

21 Fixed Shaft

22 Gearing

24 Cam -- Member

26 Guide -- Member

28 Guide Slot

30 Roller Shaft

32 Roller

34 Motor

38 Circular Long Hole

40 Engagement Salient

46 Braking Washer

48 Wave Type Lock Washer

50 Buffer -- Member

[Translation done.]